

REMARKS/ARGUMENTS

Claims 1 and 5-12 are pending. Claim 1 has been amended. Claims 2-4 and 13-35 have been canceled. Support for the amended claim is found in the specification. No new matter has been added to the amended claim.

Claims 1, 5-9, and 11 are rejected under 35 U.S.C. § 103(a) as being unpatentable over Williams (5,614,026).

Claims 10 and 12 are rejected under 35 U.S.C. § 103(a) as being unpatentable over Williams in view of Adomaitis et al. (WO 02/08487), hereafter "Adomaitis."

Claims 1, 5-9, and 11 are rejected under 35 U.S.C. § 103(a) as being unpatentable over Williams in view of Muller et al. (6,537,418), hereafter "Muller."

Claims 10 and 12 are rejected under 35 U.S.C. § 103(a) as being unpatentable over Williams in view of Muller and further in view of Adomaitis.

Claim Rejections - 35 U.S.C. § 103

Williams

Amended claim 1 recites, in part, "a first exhaust conduit in fluid communication with the chamber and adapted to receive a flow of radial exhaust gas; and a processing gas source in fluid communication with the chamber through a gas distribution showerhead, the gas distribution showerhead comprising: a first channel in fluid communication with the processing gas source and with apertures distributed over a lower surface of the showerhead, wherein the apertures define a first area; and a second channel separate from the first channel and in fluid communication with a second exhaust conduit and with exhaust apertures distributed over the lower surface of the showerhead, wherein the exhaust apertures define a second area and a ratio of the first area to the second area varies as a function of radial distance from the center of the gas distribution showerhead." Applicants respectfully submit that Williams does not teach or suggest at least these elements in the manner claimed.

The pending § 103 rejection over Williams does not establish a *prima facie* case of obviousness for the claims as amended. As stated in MPEP 2143.03, to establish *prima facie* obviousness of a claimed invention, all the claim limitations must be taught or suggested by the prior art. In particular, Williams does not teach or suggest at least "a first exhaust conduit in fluid communication with the chamber and adapted to receive a flow of radial exhaust gas ...," as recited by claim 1.

In contrast with embodiments of the present invention, Williams teaches away from a flow of radial exhaust gas. As illustrated in FIG. 3(a) of Williams, the "showerhead improves the utilization of process gas species at the substrate surface by providing gas flow in a direction perpendicular to the substrate surface and avoiding flow of the process gas or volatile byproducts laterally across the substrate surface." (Williams, Abstract, col. 3, lines 53-58). Referring to FIG. 3(b), lower ring 371 seals the region above the substrate in the radial direction, resulting in the flow of exhaust gases in a direction perpendicular to the substrate as illustrated by arrow 332. Thus, Williams fails to teach or suggest the elements of the amended claim. For at least these reasons, claim 1 is allowable over Williams.

Claims 10 and 12, which depend from claim 1, are in condition for allowance, for at least the reasons discussed in relation to claim 1, as well as for the additional elements they recite.

Williams in view of Muller

As discussed above, claim 1 recites, in part, "a first exhaust conduit in fluid communication with the chamber and adapted to receive a flow of radial exhaust gas; and a processing gas source in fluid communication with the chamber through a gas distribution showerhead, the gas distribution showerhead comprising: a first channel in fluid communication with the processing gas source and with apertures distributed over a lower surface of the showerhead, wherein the apertures define a first area; and a second channel separate from the first channel and in fluid communication with a second exhaust conduit and with exhaust apertures distributed over the lower surface of the showerhead, wherein the exhaust apertures define a second area and a ratio of the first area to the second area varies as a function of radial distance from the center of the gas distribution showerhead." Applicants respectfully submit that the cited references, either taken alone or in combination, do not teach or suggest at least these elements in the manner claimed.

In particular, the cited references do not teach or suggest all the claim limitations as required to establish a *prima facie* case of obviousness. Indeed, similar to Williams, Muller does not teach or suggest at least "a first exhaust conduit in fluid communication with the chamber and adapted to receive a flow of radial exhaust gas ...," as recited by claim 1.

In contrast with certain embodiments of the present invention, Muller teaches away from a flow of radial exhaust gas. Referring to FIG. 3C, the flow of exhaust gas is in a

direction perpendicular to the substrate surface, not in a radial direction. According to Williams, "the GDP 60 of the invention produces small cells of local equilibrium in gas pressure across the surface of the wafer 84, i.e., the partial pressure of etchgas 88 and etchproduct 90 are substantially constant across the wafer." (Muller at col. 5, lines 32-36). Since the partial pressures are substantially constant across the wafer, there is no mechanism for generating radial flow of exhaust gases and, as a result, the exhaust gases flow is in a direction perpendicular to the substrate surface as illustrated in FIG. 3C. Thus, both Williams and Muller fail to teach or suggest the elements of the amended claim. For at least these reasons, claim 1 is allowable over Williams in view of Muller.


Claims 10 and 12, which depend from claim 1, are in condition for allowance, for at least the reasons discussed in relation to claim 1, as well as for the additional elements they recite.

CONCLUSION

In view of the foregoing, Applicants believe all claims now pending in this Application are in condition for allowance and an action to that end is respectfully requested.

If the Examiner believes a telephone conference would expedite prosecution of this application, please telephone the undersigned at 650-326-2400.

Respectfully submitted,


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